## REMARKS

The Office Action dated May 30, 2007 has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

Claims 29, 32, 38 and 40 have been amended to more particularly point out and distinctly claim the subject matter of the invention. Claims 35 and 39 have been canceled without prejudice or disclaimer. No new matter has been added. Claims 21, 23-34, 36-38, and 40-42 are currently pending in the application and are respectfully submitted for consideration.

As a preliminary matter, Applicants note that, because of the resetting of the examination to the Response filed on September 15, 2006 (as shown in the Office Action Summary), the present claim amendments are based on the claims submitted on September 15, 2006.

Claim 29 was objected to because "signal filter" should be replaced by "prefilter." Claim 29 has been amended as suggested by the Office Action. Hence, the objection is rendered moot.

Claims 21, 23-26, 28-30, 32-34, 36 and 38-42 were rejected under 35 U.S.C. §102(e) as being anticipated by Zangi et al. (U.S. Patent No. 6,775,322, hereinafter "Zangi"). The rejection is respectfully traversed for at least the following reasons.

Claim 21, upon which claims 23-31 are dependent, recites a receiving station for a communication system. The receiving station includes a signal filter in communication

with a signal receiving antenna, a signal estimator in communication with the signal filter, a signal optimizer in communication with the signal filter, and a decision feedback sequence estimator in communication with the signal optimizer. The decision feedback sequence estimator includes a prefilter, a summing element in communication with the prefilter, a feedback filter in communication with the signal optimizer and the summing element, and a maximum likelihood sequence estimator in communication with the summing element.

Claim 32, upon which claims 33-37 are dependent, recites a method of communicating via a multiple input-multiple output communication system. The method includes receiving a data vector, forming optimized feed forward filter parameters from the data vector, forming optimized feedback filter parameters from the data vector, applying the optimized feed forward filter parameters to a feed forward filter to define filter characteristics of the feed forward filter, applying the optimized feedback filter parameters to a feedback filter to define filter characteristics of the feedback filter, and simultaneously performing interference cancellation and pre-filtering operations on the data vector through operation of the feed forward and feedback filters. The receiving of a data vector comprises receiving a plurality of data vectors on a corresponding plurality of receiving chains.

Claim 38, upon which claims 39-42 are dependent, recites a receiving station for a communication system. The receiving station includes signal filter means in communication with a signal receiving antenna, signal estimator means in

communication with the signal filter means, signal optimizer means in communication with the signal filter means, and interference cancellation means in communication with the signal optimizer means. The interference cancellation means comprises a prefilter, a summing means for summing in communication with the prefilter, a feedback filter means for filtering in communication with the signal optimizer means and the summing means, and a maximum likelihood sequence estimator in communication with the summing means.

As will be discussed below, Zangi fails to disclose or suggest all of the elements of the claims, and therefore fails to provide the features discussed above.

Zangi discloses a method is disclosed for computing a coefficient of a finite impulse response pre-filter applied prior to a decision algorithm in an equalizer having adjustable filter coefficients. The filter may be used in a decision feedback sequence estimation (DFSE). According to Fig. 3 of Zangi, the equalizer 100 includes a pre-filter 102, a summer 106, a decision algorithm 108, a feedback filter 104, and a processor 120 which includes an adaptive algorithm 124 and a channel estimator 122.

Applicants submit that Zangi fails to disclose or suggest all of the elements of the present claims. For example, Zangi does not disclose or suggest at least a decision feedback sequence estimator in communication with the signal optimizer, wherein the decision feedback sequence estimator comprises a prefilter, a summing element in communication with the prefilter, a feedback filter in communication with the signal

optimizer and the summing element, and a maximum likelihood sequence estimator in communication with the summing element, as recited in claim 21

With respect to the rejection of independent claim 21, in the paragraph bridging pages 3 and 4 of the detailed Office Action, the Office Action improperly equated Zangi's equalization filter 101 and decision unit 108 as Applicants' claimed decision feedback sequence estimator (DFSE).

Notably, in the same paragraph mentioned above, the Examiner immediately provided a different interpretation of Zangi and asserted that the decision unit 108 of Zangi is also "MLSE 108". That is, the decision unit 108 of Zangi is also allegedly equivalent to Applicants' claimed MLSE (e.g., MLSE 102 in Fig. 3 of the present invention), while the equalization unit 101 and the decision unit 108 of Zangi are equivalent to Applicants' DFSE (e.g., DFSE 58 in Fig. 3 of the present invention). Applicants submit that the Office Action's interpretation is clearly incorrect in that the decision unit 108 of Zangi cannot be interpreted as simultaneously being two different features of Applicants' claimed invention.

Applicants respectfully assert that, whether the equalization filter 101 and the decision unit 108 of Zangi are equivalent to Applicant's claimed DFSE, whether the decision unit 108 is equivalent to Applicants' claimed MLSE, or whether the decision unit 108 is equivalent to both Applicants' DFSE and MLSE, the Office Action's assertions are incorrect because the cited features of Zangi are not structurally and functionally equivalent to Applicants' claimed features.

In other words, Zangi fails to disclose at least a decision feedback sequence estimator in communication with the signal optimizer, wherein the decision feedback sequence estimator comprises a prefilter, a summing element in communication with the prefilter, a feedback filter in communication with the signal optimizer and the summing element, and a maximum likelihood sequence estimator in communication with the summing element, as recited in independent claim 21 of the present invention.

Further, in traversing the anticipatory rejection of independent claim 21, Applicants respectfully assert that the features disclosed in Fig. 3 of Zangi are directed to equalizer 100, and that equalizer 100 is a part of receiver 15, as shown in Fig. 1 of Zangi. As such, the Examiner's allegation that "the signal estimator 122" is in communication with the "signal filter" is inappropriate because Zangi actually discloses the "signal estimator 122" as a part of processor 120 in equalizer 100, which is actually in communication with sampler 18, as shown in Fig. 1 of Zangi. That is, in applying Zangi, the Office Action failed to consider Zangi in its entirety, and the Office Action improperly selected only features deemed relevant while ignoring the features pertinent to the intended function of the disclosed invention of Zangi.

Moreover, the Office Action's allegation that "signal optimizer 124" is in communication with the "signal filter" since it receives output from the "estimator 122 to calculate the coefficients" is insupportable because element 124 of Zangi is actually an adaptive algorithm that cooperates with the channel estimator 122 in the processor 120 of

the equalizer 100, as shown in Figs. 1 and 3 of Zangi which bear little similarity to those in Figs. 1, 2, and 3 of the present specification and of Applicants' claimed invention.

Thus, for at least the reasons discussed above, Applicants submit that Zangi fails to disclose or suggest all of the elements of claim 21. As such, Applicants respectfully request that the rejection of claim 21 be withdrawn.

With respect to the rejection of claim 32, the Office Action appears to assert that the pre-filter 102 of Zangi is equivalent to Applicants' prefilter 56, while Zangi's feedback filter 104 is equivalent to Applicants' feedback filter 92. In response, Applicants have amended independent claim 32, as shown above, to further recite the features of its dependent claim 35 so as to further clarify the claimed invention. Applicants note that the Office Action admitted that Zangi fails to teach the features recited in claim 35 as shown in Section 12, page 8, of the Office Action.

With respect to the rejection of claim 38, Applicants have amended claim 38 to include all the features of its dependent claim 39 so as to more particularly claim the invention. Accordingly, claim 39 has been canceled and claim 40 has been amended to change its dependency from claim 39 to claim 38. Applicants respectfully assert that, by amending claim 38, the arguments set forth in relation to the rejection of independent claim 21 are also applicable to overcome the rejection of independent claim 38.

Therefore, for at least the reasons outlined above, Applicants submit that Zangi fails to disclose or suggest all of the elements of claims 21, 32 and 38. Claims 23-26, 28-30, 33-34, 36 and 39-42 are dependent upon claims 21, 32, and 38, respectively. As

such, claims 23-26, 28-30, 33-34, 36 and 39-42 should be allowed for at least their dependence upon claims 21, 32, and 38, and for the specific limitations recited therein.

Claims 27 and 37 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Zangi and Taylor et al. (U.S. Patent Application Publication No. 2002/0197987, hereinafter "Taylor"). The Office Action alleged that Zangi teaches every feature of the claimed invention, with the exception of a deinterleaver in communication with an output of a MLSE and a depuncturer in communication with a deinterleaver and a channel decoder in communication with the deinterleaver. The Office Action then cited Taylor as allegedly curing the deficiencies in Zangi and asserted that it would have been obvious to incorporate such a teaching in Zangi in order to recover the originally transmitted signal. Applicants respectfully traverse the rejection at least for the reasons set forth above in relation to the anticipatory rejection over Zangi and for the reasons discussed below.

Zangi is discussed above. Taylor discloses a method for transparent data transmission for wireless/cellular communication system. An analog signal from a modem or other source is converted at a remote station to a digital bit stream in accordance with a memoryless compaction rule. The resultant bit stream is then transmitted through a transparent channel that includes a wireless cellular-telephone link. At the base station, that bit stream is transmitted over a public-switched-network span.

In view of the description provided in Zangi and Taylor, Applicants respectfully submit that there is no motivation or suggestion to combine Taylor and Zangi. While the presently claimed invention is related to a Multiple-Input, Multiple-Output (MIMO)

communication system, neither Taylor nor Zangi appears to be related to a MIMO communication system.

Additionally, in Section 11, on page 7 of the detailed Office Action, it is asserted that the demodulator 56 of Taylor is equivalent to Applicants' MLSE. However, as shown in Fig. 3 of Taylor, the demodulator 56 is situated between receiver 54 and de-interleaver 58, and it appears that the demodulator 56 is simply for demodulating a received signal and has no resemblance to Applicants' claimed maximum likelihood sequence estimator (i.e., MLSE 102 as shown in Fig. 3 of the present invention).

Furthermore, Applicants respectfully assert that neither Taylor nor Zangi teaches, discloses or suggests how or why their respective different inventions may be combined to arrive at Applicants' claimed invention to achieve an efficient way to process encoding and decoding scheme for a MIMO communication system. Accordingly, Applicants respectfully request that the rejection of claims 27 and 37 be withdrawn.

Claims 31 and 35 were rejected under 35 U.S.C. §103(a) as being unpatentable over Zangi in view of Malkemes et al. (U.S. Patent Application Publication No. 2002/0106040, hereinafter "Malkemes"). The Office Action asserted that Zangi discloses all of the elements of the claims, with the exception of a receiving station comprising a plurality of receive chains that correspond to a plurality of signal receiving antennas configured to receive and transmit a plurality of signal vectors to the plurality of receive chains. The Office Action then cited Malkemes as allegedly curing the deficiencies of Zangi.

Applicants respectfully traverse the rejection of claim 31, at least for the reasons set forth above, in relation to the anticipatory rejection over Zangi, and for the reasons discussed below. Claim 35, however, has been canceled and therefore the rejection of claim 35 is rendered moot.

Zangi is discussed above. Malkemes teaches a method and apparatus for reducing multipath distortion in a wireless LAN system with a plurality of antennae 102, and tuners 108 and 110 that provide received signals to a timing recover circuitry 112 and a spatial diversity combiner 150. However, Malkemes does not disclose or suggest a DFSE having the configuration as recited in claim 21 or a method having the steps recited in claim 32. Hence, the combination of Malkemes and Zangi still does not arrive at Applicants' claimed invention as recited in claim 31.

Moreover, as Zangi does not disclose or suggest a multiple-input and multiple-output communication system, the combination of Zangi and Malkemes is not proper without motivation or suggestion to combine the different teachings of Zangi and Malkemes to arrive at Applicants' invention. Accordingly, Applicants submit that the combination of Zangi and Malkemes fails to disclose or suggest all of the elements of claim 31. As such, Applicants respectfully request that this rejection be withdrawn.

For at least the reasons discussed above, Applicants respectfully submit that the cited prior art fails to disclose or suggest all of the elements of the claimed invention. These distinctions are more than sufficient to render the claimed invention unanticipated

and unobvious. It is therefore respectfully requested that all of claims 21, 23-34, 36-38, and 40-42 be allowed, and this application passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicants' undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,

Majid S. AlBassam
Registration No. 54,749

**Customer No. 32294**
SQUIRE, SANDERS & DEMPSEY LLP
14TH Floor
8000 Towers Crescent Drive
Tysons Corner, Virginia 22182-2700
Telephone: 703-720-7800
Fax: 703-720-7802

MSA:jf